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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/652,862	08/29/2003	Francesco Ciovacco	02-AG-228/RR	1003

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EXAMINER	
RAMILLANO, LORE JANET	
ART UNIT	**PAPER NUMBER**
1743	

MAIL DATE	DELIVERY MODE
09/20/2007	PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/652,862	CIOVACCO ET AL.	
	Examiner	Art Unit	
	Lore Ramillano	1743	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *05 July 2007*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-9,11-21 and 23-33* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-9, 11-21, and 23-33* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *29 August 2003* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☒ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Status of Claims

1. In applicant's reply filed on 7/5/07, applicant amended claims 1, 2, 5, 11, 13, 14, 17, 23, 25, and 29; added new claims 32 and 33; and cancelled claims 10 and 22. Claims 1-9, 11-21, and 23-33 are pending and under examination.

Response to Amendment

Claim Rejections - 35 USC § 112

2. The rejection of claims 5 and 11, under 112, second paragraph, is maintained because the recited language, "and wherein the fluorocarbon (or hydrocarbon) constituent of the gas facilitates the reaction of the nitrogen with the plasma," does not appear to clearly recite the subject matter of applicant's invention, as recited in p. 8, line 29 to p. 9, line 14 of applicant's specification. According to the subject matter recited in p. 8, line 29 to p. 9, line 14, it appears that the gas generates the plasma and does not facilitate the reaction. Furthermore, the composition in the plasma, which is CF4 or CH4, facilitates the reaction of the host plasma with the nitrogen, which is a constituent of the air.

On the other hand, based on the recited language in claims 5 and 11, it appears to convey that three separate components (gas, plasma, and air) are producing the at least one predetermined compound. For this reason, examiner recommends amending the recited language in claims 5 and 11 to clearly convey the subject matter recited in p. 8, line 29 to p. 9, line 14 of applicant's specification.

Prior art rejections

3. In light of applicant's amendments, the rejections over the prior art are withdrawn. New rejections follow.

Claim Rejections - 35 USC § 102

4. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(a) the invention was known or used by others in this country, or patented or described in a printed publication in this or a foreign country, before the invention thereof by the applicant for a patent.

5. **Claims 1-9, 11-21, 23-31, and 33** are rejected under 35 U.S.C. 102(a) as being anticipated by Singh et al. ("Singh," WO 02/23585) and in light of Levinstein et al. ("Levinstein," US 4256534) and Kyotani (US 6409802).

As to claims 1-9, 11-21, 23-24 Singh teaches a method of detecting a leak and a computer readable medium comprising the following steps: prior to establishing a plasma inside a chamber of a reactor, removing nitrogen-based compounds from the chamber of the reactor (i.e. removing atmospheric pressure (i.e. nitrogen-based compounds) from the chamber, p. 4, lines 4-31); establishing a plasma inside a reactor, the plasma having a composition suitable to generate at least one predetermined compound when reacting with air; detecting a light emission of the plasma; and analyzing the light emission to identify the presence of the at least one predetermined compound. (i.e. p. 3, line 25 to p. 5, line 15).

Singh further teaches the following regarding before establishing the plasma inside the reactor: processing at least one wafer of semiconductor material and removing the least one

wafer from the reactor; and the air includes nitrogen, the at least one predetermined compound (i.e. CN) resulting from the reaction of nitrogen with the plasma. (i.e. p. 4, line 4 to p. 5, line 6).

Singh further teaches the following regarding establishing a plasma inside a reactor: providing a flow of a gas including a fluorocarbon constituent, and keeping the gas at a pressure substantially in the range from 50 mtorr to 110 mtorr. (i.e. p. 4, line 12 to p. 5, line 6).

As to claims 25-28, Singh also teaches an apparatus comprising: means for removing nitrogen-based compounds from a chamber of a plasma reactor prior to establishing a plasma inside the chamber of the reactor; means for establishing a plasma inside a plasma reactor, the plasma having a composition suitable to generate at least one predetermined compound when reacting with air; means for detecting a light emission of the plasma; and means for analyzing the light emission to identify the presence of the at least one predetermined compound for detecting a leak of external air into the plasma reactor. (i.e. p. 3, line 25 to p. 5, line 15).

Singh further teaches the following regarding means for establishing the plasma inside the reactor: means for providing a flow of a gas including a fluorocarbon constituent, and means for keeping the gas at a pressure substantially in the range from 50 mtorr to 110 mtorr. (i.e. p. 4, line 12 to p. 5, line 6).

As to claims 29-31, Singh also teaches a system comprising: a plasma reactor; and an apparatus, coupled to the plasma reactor, for detecting a leak of external air into the plasma reactor, the apparatus comprising: means for removing nitrogen-based compounds from a chamber of a plasma reactor prior to establishing a plasma inside the chamber of the reactor; means for establishing a plasma inside a plasma reactor, the plasma having a composition suitable to generate at least one predetermined compound when reacting with air; means for

detecting a light emission of the plasma; and means for analyzing the light emission to identify the presence of the at least one predetermined compound for detecting a leak of external air into the plasma reactor. (i.e. p. 3, line 25 to p. 5, line 15).

Singh further teaches the following regarding means for establishing the plasma inside the reactor: means for providing a flow of a gas including a fluorocarbon constituent. (i.e. p. 5, lines 1-6).

Singh inherently teaches a source of power substantially in the range from 400W to 600W because Singh's invention inherently utilizes power to function and Levinstein teaches that the plasma etching process requires a power of 400-600 watts (i.e. column 8, lines 62-64).

Furthermore, Singh inherently teaches, with regarding to the means for establishing the plasma inside the reactor, that the means for providing a flow of a gas inherently includes a fluorocarbon constituent, such as CF4, and a hydrocarbon constituent, such as CH4, since Kyotani teaches that etching of a silicon wafer or the like is commonly performed utilizing such constituents. (i.e. column 1, lines 51-60).

Claim Rejections - 35 USC § 103

6. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

7. The factual inquiries set forth in *Graham* **v.** *John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

8. This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

9. **Claims 1-9, 11-21, 23-33** rejected under 35 U.S.C. 103(a) as being unpatentable over Sui et al. ("Sui," WO 00/03421).

As to claims 1-9, 11-21, and 23-24, Sui teaches a method of detecting a leak and a computer readable medium (i.e. p. 11-16, Fig. 3) comprising the following steps: establishing a plasma inside a reactor (i.e. 56, Fig. 2), the plasma having a composition suitable to generate at least one predetermined compound when reacting with air; detecting a light emission of the plasma; and analyzing the light emission to identify the presence of the at least one predetermined compound. (i.e. p. 16, line 16 to p. 18, line 35).

Sui further teaches the following regarding before establishing the plasma inside the reactor: processing at least one wafer of semiconductor material, and removing the least one wafer from the reactor; and the air includes nitrogen, the at least one predetermined compound

(i.e. CN) resulting from the reaction of nitrogen with the plasma. (i.e. p. 16, line 16 to p. 19, line 31).

Sui further teaches the following regarding establishing a plasma inside a reactor: providing a flow of a gas including a fluorocarbon constituent (i.e. CF4), and keeping the gas at a pressure substantially in the range from 50 mtorr to 110 mtorr and applying a source power substantially in the range from 400W to 600W; or providing a flow of a gas including a hydrocarbon constituent (i.e. CH4), keeping the gas at a pressure substantially in the range from 50 mtorr to 110 mtorr and applying a source power substantially in the range from 400W to 600W. (i.e. p. 10, lines 6-14; p. 16, line 30 to p. 17, line 7).

As to claims 25-28, Sui also teaches an apparatus comprising: means for establishing a plasma inside a plasma reactor, the plasma having a composition suitable to generate at least one predetermined compound when reacting with air; means for detecting a light emission of the plasma; and means for analyzing the light emission to identify the presence of the at least one predetermined compound for detecting a leak of external air into the plasma reactor. (i.e. Figs. 2 and 3; p. 16, line 16 to p. 18, line 35).

Sui further teaches the following regarding means for establishing the plasma inside the reactor: means for providing a flow of a gas including a fluorocarbon constituent (i.e. CF4), and means for keeping the gas at a pressure substantially in the range from 50 mtorr to 110 mtorr and means for applying a source power substantially in the range from 400W to 600W; or means for providing a flow of a gas including a hydrocarbon constituent (i.e. CH4), means for keeping the gas at a pressure substantially in the range from 50 mtorr to 110 mtorr and means for applying a

source power substantially in the range from 400W to 600W. (i.e. p. 10, lines 6-14; p. 16, line 30 to p. 17, line 7).

As to claims 29-31, Sui also teaches a system comprising: a plasma reactor; and an apparatus, coupled to the plasma reactor, for detecting a leak of external air into the plasma reactor, the apparatus comprising: means for establishing a plasma inside a plasma reactor, the plasma having a composition suitable to generate at least one predetermined compound when reacting with air; means for detecting a light emission of the plasma; and means for analyzing the light emission to identify the presence of the at least one predetermined compound for detecting a leak of external air into the plasma reactor. (i.e. Fig. 2; p. 16, line 16 to p. 18, line 35).

Sui further teaches the following regarding means for establishing the plasma inside the reactor: means for providing a flow of a gas including a fluorocarbon constituent (i.e. CF4), and a hydrocarbon constituent (CH4). (i.e. p. 16, line 30 to p. 17, line 7).

As to claim 32, Sui teaches a step of establishing the plasma when there is no wafer present within the chamber of the reactor (i.e. p. 9, line 27 to p. 10, line 14).

While Sui teaches having process gas control instruction sets that control the composition and flow rates of process gas supplied into the chamber, Sui does not specifically teach the following step: "prior to establishing a plasma inside a chamber of a reactor, removing nitrogen-based compounds from the chamber of the reactor." It would have been obvious to a person of ordinary skill in the art to modify Sui's detection method by removing nitrogen-based compounds from the chamber of the reactor before establishing a plasma inside a chamber of a reactor because Sui teaches that a user has the ability to control what is being introduced and removed from the chamber(s) and Sui recognizes that the process (i.e. etching process) can be

performed in multiple stages, for example, each stage having different process conditions (i.e. p. 13, line 9 to p. 14, line 32; and p. 16, lines 18-34).

10. **Claims 1-3, 13-15, 25-26, and 29-30** are rejected under 35 U.S.C. 103(a) as being unpatentable over Zajac (US 4857136).

As to claims 1-3 and 13-15, Zajac teaches a method of detecting a leak and a computer readable medium (i.e. 23, Fig. 1) comprising the following steps: establishing a plasma inside a reactor (i.e. 11, Fig. 1), the plasma having a composition suitable to generate at least one predetermined compound when reacting with air; detecting a light emission of the plasma; and analyzing the light emission to identify the presence of the at least one predetermined compound. (i.e. column 2, line 6 to column 3, line 28).

Zajac further teaches the following regarding before establishing the plasma inside the reactor: processing at least one wafer of semiconductor material, removing the least one wafer from the reactor, and cleaning the reactor (i.e. column 2, line 6 to column 3, line 28).

Zajac further teaches the following regarding establishing a plasma inside a reactor: providing a flow of a gas including a fluorocarbon constituent (i.e. column 3, lines 24-28).

As to claims 25-26, Zajac also teaches an apparatus comprising: means for establishing a plasma inside a plasma reactor, the plasma having a composition suitable to generate at least one predetermined compound when reacting with air; means for detecting a light emission of the plasma; and means for analyzing the light emission to identify the presence of the at least one predetermined compound for detecting a leak of external air into the plasma reactor. (i.e. column 2, line 6 to column 3, line 28).

Zajac further teaches the following regarding means for establishing the plasma inside the reactor: means for providing a flow of a gas including a fluorocarbon constituent (i.e. column 3, lines 24-28).

As to claims 29-30, Zajac also teaches a system comprising: a plasma reactor; and an apparatus, coupled to the plasma reactor, for detecting a leak of external air into the plasma reactor, the apparatus comprising: means for establishing a plasma inside a plasma reactor, the plasma having a composition suitable to generate at least one predetermined compound when reacting with air; means for detecting a light emission of the plasma; and means for analyzing the light emission to identify the presence of the at least one predetermined compound for detecting a leak of external air into the plasma reactor. (i.e. column 2, line 6 to column 3, line 28).

Zajac further teaches the following regarding means for establishing the plasma inside the reactor: means for providing a flow of a gas including a fluorocarbon constituent (i.e. column 3, lines 24-28).

While Zajac teaches a detection method that involves removing gases from the chamber of the reactor (i.e. column 2, lines 6-18), detecting a number of conditions such as the starting point (i.e. of the plasma etching process), system cleanliness (i.e. reactor), air leaks, etc. (i.e. column 3, lines 11-28), Zajac does not specifically teach the step of removing nitrogen-based compounds from a chamber of a reactor. It would have been obvious to a person of ordinary skill in the art to specifically include nitrogen-based compounds as one of the gases to remove from a chamber of the reactor because it would be desirable to process semiconductor wafers in a vacuum-type of environment to insure that the finished wafers do not contain any extraneous components.

11. **Claim 32** is rejected under 35 U.S.C. 103(a) as being unpatentable over Singh and in light of Levinstein and Kyotani, as applied to claims 1-9, 11-21, 23-31, and 33 above, and further in view of Powell et al. ("Powell," US 6256186).

The teachings of Singh in light of Levinstein and Kyotani are indicated above.

Powell teaches an invention that consists of a semi-conductor wafer processing apparatus comprising a plasma etching reactor, an electrostatic chuck and control means for processing, e.g. etching, a wafer when it is on the platen and for etching when no wafer is present (i.e. column 2, lines 11-16). Powell further teaches that an oxygen and carbon tetrafluoride plasma is consequently run for 5 seconds or so immediately prior to the next wafer being loaded onto the surface (column 4, lines 27-34).

It would have been obvious to a person of ordinary skill in the art to modify the modified Singh by incorporating a step of establishing the plasma when there is no wafer present within the chamber of the reactor because introducing plasma inside the chamber of the reactor without the wafer would insure that the next wafer placed inside the chamber of the reactor will be processed in a "clean" environment since Powell teaches that the plasma can be used for cleaning the chamber of the reactor (i.e. column 4, lines 27-34).

Response to Arguments

12. Applicant's arguments with respect to claims 1-9, 11-21, and 23-31 have been considered but are moot in view of the new ground(s) of rejection.

Conclusion

13. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Lore Ramillano whose telephone number is (571) 272-7420. The examiner can normally be reached on Mon. to Fri.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Jill Warden can be reached on (571) 272-1267. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR

system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

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